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KNOBBE MARTENS OLSON & BEAR LLP  
2040 MAIN STREET  
FOURTEENTH FLOOR  
IRVINE, CA 92614

EXAMINER

NGUYEN, CUONG QUANG

ART UNIT PAPER NUMBER

2811

DATE MAILED: 09/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/971,955

Applicant(s)

BASCERI ET AL.

Examiner

Cuong Q Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 29-36 and 54-77 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 29-36, 54-77 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_ 6) ☐ Other: \_\_\_\_

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## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or  
(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claims 16-17, 29-33, 67-69 and 72-73 are rejected under 35 U.S.C. 102(b) as being anticipated by Summerfelt et al. (US 5,781,404).

Regarding claims 29, 30, 31, 72, 73, 75, 76, Summerfelt et al. discloses a thin film capacitor structure comprising: a substrate assembly (40); an electrode material (30, a Pt layer) formed over the substrate; a nucleation layer (38, an acceptor Mn or a donor Nb layer) (TABLE 2) formed over the electrode material; a BST film (34) formed over the nucleation layer. See Summerfelt et al.'s Fig.4 and Fig.5.

It is noted that the nucleation layer is formed of Mn or Nb which is the same material for forming the nucleation layer in the present invention. So, it is inherent that the nucleation (38) in Summerfelt et al.'s device is capable to function as improving the

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uniformity of a crystal orientation of the BST film as claimed. When the structure recited in claims reference is substantially identical in structure or composition, or are produced by identical or substantially identical to that of the claims, claimed properties of functions are presumed to be inherent. In re Best, 195 USPQ 430, 433 (CCPA 1977). 1990).

Regarding claims 31, 32, 33, 67, 68, 69, as shown in Fujii et al.'s Fig.4, an orientation layer (43, a Pt layer having an orientation of (100) (a first electrode layer) formed between the BST layer (44) and the NiO nucleation layer (42) and a second electrode layer (45) formed on the BST layer.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 29-33, 35-36, 54-66, and 77 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. (JP406333772A) in view of Summerfelt et al. (US 5,781,404).

Regarding claims 29, 30, 31, 54, 55, 56, 57, 58, 59, 60, 63, 72, 73, 75, Fujii et al. discloses a thin film capacitor structure comprising: a substrate assembly (1); an electrode material (2, a Pt layer) formed over the substrate; a nucleation layer (3, a NiO

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layer); a BST film (4) having a substantially uniform crystal orientation of (100). See Fujii et al.'s Fig.1.

Summerfelt et al. discloses a thin film capacitor structure comprising: a strontium titanate (ST) layer (32) or Mn (acceptor) or Nb (donor) layer (38) (TABLE 2) formed between a BST layer (34) and a Pt layer (30). See Summerfelt et al.'s Fig.4 and Fig.5.

It would have been obvious to one of ordinary skill in the art to incorporate the ST or Mn or Nb layer between a BST layer and a Pt layer as taught by Summerfelt et al. into Fujii et al.'s device (Fig.4) in order to reduce the leakage current. See Summerfelt et al.'s col.3 lines 15-25.

It is noted that the first and second nucleation layers in the device being formed by the combination of is formed of Fujii et al. and Summerfelt et al. are the same materials for forming the first and second nucleation layers in the present invention. So, it is inherent that the nucleations in combined device is capable to function as aiding in forming BST film with substantially uniform crystal orientation as claimed. When the structure recited in claims reference is substantially identical in structure or composition, or are produced by identical or substantially identical to that of the claims, claimed properties of functions are presumed to be inherent. In re Best, 195 USPQ 430, 433 (CCPA 1977). 1990).

Regarding claim 74, It is noted that the ST layer is considered as a second nucleation layer which is contains Ti.

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Regarding claims 32, 33, as shown in Fujii et al.'s Fig.4, an orientation layer (43, a Pt layer having an orientation of (100) (a first electrode layer) formed between the BST layer (44) and the NiO nucleation layer (42) and a second electrode layer (45) formed on the BST layer.

Regarding claim 64, Fujii et al. does not explicitly teach that the substrate assembly includes polysilicon.

It is conventional and also taught by Summerfelt et al. that a polysilicon plug is commonly formed to connect the lower capacitor electrode to the silicon substrate.

It would have been obvious to one of ordinary skill in the art to form the conventional polysilicon plug as taught by Summerfelt et al. into Fujii et al.'s device in order to connect the lower capacitor electrode to the silicon substrate.

Regarding claims 35, 36, 61, 62, 65, 66, and 77, Fujii et al. and Summerfelt et al. substantially teach all the limitations of claims 29, 54, 67 and 72. However, these references do not explicitly teach the nucleation having a thickness of less than about 50 angstroms, BST film having a thickness of about 150 to 300 angstroms.

It would have been obvious to one of ordinary skill in the art to provide the nucleation layer, BST layer having a thickness in the range as claimed, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPTO 233.

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Claims 34, 65, 66, 67, 68, 69, 70, and 71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. in view of Summerfelt et al. and further in view of Ueda et al. (US 6,238,966).

Fujii et al., Summerfelt et al. are substantially teach all the limitations of claims 29-33, 35-36, 54-66, and 77 as shown above but does not explicitly teach that the BST film comprises between about 50 and 53.5 atomic % of titanium.

Ueda et al. discloses a capacitor structure including a BST film comprising between about 50 and 60 atomic % of titanium. Col.12 lines 30-37.

It would have been obvious to one of ordinary skill in the art to form the BST film containing amount of titanium as taught by Ueda et al. into the device being formed by the combination of Fujii et al. and Summerfelt et al. in order to decrease the leakage current and enhance the charge storability of capacitor. See abstract.

### ***Response to Arguments***

3. Applicant's arguments with respect to claims 29-36 and 54-77 have been considered but are moot in view of above new ground(s) of rejection.

### ***Conclusion***

4. Papers related to this application may be submitted to Technology center (TC) 2800 by facsimile transmission. Papers should be faxed to TC 2800 via the TC 2800 Fax center located in Crystal Plaza 4, room 4-C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG

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**30 (November 15, 1989). The Group 2811 Fax Center number is (703) 308-7722 and 308-7724. The Group 2811 Fax Center is to be used only for papers related to Group 2811 applications.**

5. Any inquiry concerning this communication or any earlier communication from the Examiner should be directed to CUONG Q NGUYEN whose telephone number is (703) 308-1293. The Examiner is in the Office generally between the hours of 6:30 AM to 5:00 PM (Eastern Standard Time) Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor TOM THOMAS who can be reached on (703) 308-2772. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7722 or 308-7724.

Any inquiry of a general nature or relating to the status of this application should be directed to the Technology Center Receptionists whose telephone number is 308-0956.



Cuong Nguyen

Primary examiner

September 16, 2003